

## CLAIMS

1. Device for detecting crossing of a horizontal lane demarcation mark of a carriageway for motor vehicles, characterized in that it includes at least one box (2) to be placed under the vehicle and enclosing means for projecting two light beams (4, 6) onto the carriageway (8) in two distinct zones (10, 12), and distinct means for picking  
5 up each of the two light beams (14, 16) after reflection onto the carriageway (8).

2. Detection device according to claim 1, characterized in that the at least one box (2), exhibiting a general axis of symmetry (z-z') encloses a single light source (40) emitting a primary light beam (50) in the direction of the carriageway (8) and at least one photo-sensor (44, 46) for detecting the light after reflection on the  
10 carriageway (8), two first optical devices whose optical axes are inclined at a first value ( $\alpha$ ) with respect to the general axis of symmetry (z-z') of the box being disposed on the path of the primary light beam (50) as it exits the optical source, so as to split said primary light beam (50) into two secondary light beams (4, 6) projected onto the carriageway (8) in two distinct zones (10, 12), and two second optical devices whose  
15 optical axes are inclined at a second value ( $\beta$ ) with respect to the general axis of symmetry (z-z') of the box (2) being disposed on the path of the secondary light beams (14, 16) after the latter have been reflected onto the carriageway (8) and before they reach the at least one photo-sensor (44, 46).

3. Detection device according to claim 1, characterized in that the at least  
20 one box (2), exhibiting a general axis of symmetry (z-z') encloses two light sources (40, 42) each emitting a light beam (4, 6) in the direction of the carriageway (8) and at least one photo-sensor (44, 46) for detecting the light after reflection on the carriageway (8), two first optical devices whose optical axes are inclined at a first value ( $\alpha$ ) with respect to the general axis of symmetry (z-z') of the box (2) being each  
25 disposed on the path of one of the light beams (4, 6) as it exits the corresponding optical source (40, 42), so as to project said two light beams (4, 6) onto the carriageway (8) in two distinct zones (10, 12), and two second optical devices whose optical axes are inclined at a second value ( $\beta$ ) with respect to the general axis of symmetry (z-z') of the box (2) being disposed on the path of the light beams (14, 16)  
30 after the latter have been reflected onto the carriageway (8) and before they reach the at least one photo-sensor (44, 46).

4. Detection device according to any of claims 2 or 3, characterized in that the first two and the second two optical devices each include at least one lens (32b, 34b, 36b, 38b).

5. Device according to claim 4, characterized in that the lenses are revolution lenses or do not exhibit axial symmetry.

6. Detection device according to any of claims 4 or 5, characterized in that the lenses (32b, 34b, 36b, 38b) are of the mineral type.

5        7. Detection device according to any of claims 4 or 5, characterized in that the lenses (32b, 34b, 36b, 38b) are of the organic type.

8. Detection device according to any of claims 4 to 7, characterized in that the box (2) includes a body (24) and an optical unit (26) which carries the lenses.

9. Detection device according to claim 8, characterized in that the lenses  
10 (32b, 34b, 36b, 38b) are individually mounted on the optical unit (26).

10. Detection device according to claim 8, characterized in that the lenses (32b, 34b, 36b, 38b) are integral with the optical unit (26).

11. Detection device according to any of claims 7 to 10, characterized in that the optical unit (26) includes a base (30) on which two optical transmission tubes (32,  
15 34) stand and two optical reception tubes (36, 38).

12. Detection device according to claim 11, characterized in that the body (24) of the box (2) has cavities (32a, 34a, 36a, 38a) for receiving the transmission tubes (32, 34) and reception tubes (36, 38) of the optical unit (26).

13. Detection device according to any of claims 2 to 12, characterized in that  
20 the light sources (40, 42) include light emitting diodes emitting in the infrared range.

14. Detection device according to any of claims 2 to 13, characterized in that the light sources (40, 42) and the photo-sensors (44, 46) are mounted by SMD or flip-chip on a printed circuit board (48).

15. Detection device according to any of claims 1 to 14, characterized in that  
25 the light beams (4, 6) are focussed at the surface of the carriageway (8).

16. Device according to any of claims 2 to 15, characterized in that the first two and the second two optical devices include a screen disposed obliquely in front of the light sources (40, 42) and pierced with a hole.